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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/581,060	05/30/2006	Masaharu Kawakubo	127873	6788

25944 7590 10/27/2009
OLIFF & BERRIDGE, PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

EXAMINER	
RIDDLE, CHRISTINA A	

ART UNIT	PAPER NUMBER
2882	

MAIL DATE	DELIVERY MODE
10/27/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/581,060	KAWAKUBO ET AL.	
	Examiner	Art Unit	
	Christina Riddle	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 August 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *31,33-35,37-39,42-44,49-52,54-57 and 61* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *31,33-35,37-39,42-44,49-52,54-57 and 61* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Status

1. Acknowledgment is made of the amendment filed on 8/20/2009 which amended claims 31, 33-35, 37-39, 42-44, 49-52, 54-57, and 61 and cancelled claims 32, 40, 41, 46-48, 59, 60, and 62. Thus, claims 31, 33-35, 37-39, 42-44, 49-52, 54-57, and 61 are currently pending.

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/20/209 has been entered.

Specification

3. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: the recitation of "a computer readable medium" in claim 61 has not antecedent basis in the specification.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 31, 33-35, 37-39, 42-44, 49-52, 54-57, and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kikuchi (US PGPub 2002/0042664) in view of Tomimatu (US Patent No. 6,338,925) and further in view of Irie et al. (US Patent No. 5,808,910, referred to as Irie hereinafter).

Note: Kikuchi (US PGPub 2004/0126004) is referred to for the English translation of text for the Figures of Kikuchi (US PGPub 2002/0042664).

Regarding claims 31 and 61, Kikuchi discloses an exposure method in which an exposure processing of a specific process is performed to each of a plurality of photosensitive objects in a plurality of lots (para. [0029] and [0083], multiple lots with multiple substrates are processed), the method comprising:

with respect to a first lot in the specific process,

calculating an estimate value of positional information of each of a plurality of divided areas on the photosensitive object (para. [0185], in step 310 of Fig. 5, the position of all shots are calculated by statistical computation based on measurement of positions of shots in terms of design) which is used to align each of the plurality of

divided areas with a predetermined point by a statistical computation using actual measurement values of positional information of a plurality of specific divided areas selected from the plurality of divided areas on the photosensitive object (Fig. 5 and para. [0185], the position-coordinates of the shot areas are determined via statistical computation using a least square method consisting of EGA computation from sample shot areas (see para. [0009]) selected form the shot areas),

creating correction information (paras. [0203]-[0204] and Fig. 5, correction values are calculated) used to correct a non-linear component of positional deviation amount of each of the plurality of divided areas (Fig. 5, step 312, non-linear components of all shot areas are calculated) from an individual fiducial position (para. [0187], design position) based on the actual measurement values of positional information of the plurality of specific divided areas and on the corresponding estimate value (paras. [0186]-[0187] and Fig. 5, steps 312 and 314, correction information is calculated based on the difference between the position-coordinate for each shot as determined from the EGA computation of the sample shots in step 310 and the position-coordinate in terms of design, and the difference between the results of step 308 and step 310 are used to determined the non-linear component. Then, step 314 evaluates the non-linear component, which leads to the calculation of the correction values for the non-linear components of the deviations of all shots in step 318), and

performing exposure while controlling a position of the photosensitive object based on the estimate value of the positional information of each of the plurality of divided areas and on the correction information (Fig. 5, step 322 and para. [0204],

exposure is performed based on the calculated position coordinates and the correction values); and

with respect to every (K-1) lot of second and subsequent lots in the specific process, for a plurality of measurement divided areas on the photosensitive object that includes at least the plurality of specific divided areas, wherein the K is an integer not less than 2 (para. [0029] and [0083], multiple lots with multiple substrates are processed),

calculating a non-linear component of positional deviation amount of each of the measurement divided areas from the individual fiducial position based on an actual measurement value of positional information of each of the measurement divided areas and on the corresponding estimate value (para. [0186] and Fig. 5, in step 312, the non-linear components for each shot area are calculated by calculating the difference between the position-coordinate for each shot area for step 310),

performing exposure while controlling the position of the photosensitive object based on the estimate value of positional information of each of the plurality of divided areas and on the correction information that is latest (Fig. 5, step 322, the arrangement coordinates currently stored in memory and the correction values are used to correct each shot area to perform exposure),

However, Kikuchi does not appear to explicitly describe updating the correction information as needed in accordance with a magnitude of one of the calculated non-linear component of positional deviation amount of each of the measurement divided areas and a variation amount of the non-linear component, but not updating the

correction information with respect to the remaining lots.

However, Tomimatu discloses updating information as needed but not updating the correction information with respect to the remaining lots (Fig. 3, step 22, the obsolescence of data is used to determine whether to update information for further processing of lots).

It would have been obvious to one skilled in the art at the time of the invention to have included updating information as needed as taught by Tomimatu in the exposure method with the predetermined intervals of performing the method taught by Kikuchi in since it is much more efficient to automate control of performing alignment calibration than to manually, and possibly needlessly, recalibrate every production lot.

Although Kikuchi as modified by Tomimatu discloses updating the non-linear correction information as needed, but not updating the correction information with respect to the remaining lots, Kikuchi as modified by Tomimatu does not appear to explicitly describe calculating a magnitude of one of the calculated non-linear component of positional deviation amount of each of the measurement divided areas and a variation amount of the non-linear component.

However, Irie discloses calculating a magnitude of one of the calculated non-linear component of positional deviation amount of each of the measurement divided areas and a variation amount of the non-linear component (Fig. 11, step 206, 210, and 211, the absolute value of the calculated non-linear error component is compared to a predetermined value).

It would have been obvious to one skilled in the art at the time of the invention to have used a calculated magnitude of one of the calculated non-linear component of positional deviation amount and a variation amount of the non-linear component as taught by Irie with updating the correction information as needed in the exposure method taught by Kikuchi as modified by Tomimatu since, as shown by Irie, a magnitude the calculated non-linear component of positional deviation is commonly used to determine which sample shots should be used to perform alignment with high accuracy and high speed (col. 3, lines 19-22).

Regarding claim 33, although Kikuchi as modified by Tomimatu discloses updating the correction information, Kikuchi as modified by Tomimatu does not appear to explicitly describe when updating the correction information among the plurality of divided areas, at least a part of remaining divided areas excluding the measurement divided areas are new measurement divided areas, and the correction information is updated using a non-linear component of positional deviation amount of each of the plurality of divided areas from the individual fiducial position calculated based on actual measurement values of positional information of all measurement divided areas including the new measurement divided areas and the corresponding estimate values.

However, Irie further discloses when updating the correction information among the plurality of divided areas, at least a part of remaining divided areas excluding the measurement divided areas are new measurement divided areas (Fig. 11, step 207, alternate shots are measured), and the correction information is updated using a non-linear component of positional deviation amount of each of the plurality of divided areas

from the individual fiducial position calculated based on actual measurement values of positional information of all measurement divided areas including the new measurement divided areas and the corresponding estimate values(Fig. 11, steps 207, 211, and 217, the alternate shots and sample shots are used to calculate arrangement coordinates).

It would have been obvious to one skilled in the art at the time of the invention to have used remaining divided areas as new measurement divided areas as taught by Irie with updating the correction information as needed in the exposure method taught by Kikuchi as modified by Tomimatu since, as shown by Irie, using remaining divided areas as new measurement divided areas is commonly used to perform alignment with high accuracy and high speed (col. 3, lines 19-22).

Regarding claim 34, although Kikuchi as modified by Tomimatu discloses updating correction information, Kikuchi as modified by Tomimatu does not appear to explicitly describe wherein the new measurement divided areas are determined based on evaluation results of the non-linear component of positional deviation amount of each of the plurality of divided areas included in the correction information.

However, Irie discloses wherein the new measurement divided areas are determined based on evaluation results of the non-linear component of positional deviation amount of each of the plurality of divided areas included in the correction information (Fig. 11, step 206 discloses evaluating the results of the non-linear component of positional deviation to determine the sample shot areas).

It would have been obvious to one skilled in the art at the time of the invention to have determined the new measurement divided areas based on evaluation results of

non-linear component of the positional deviation amount as taught by Irie with updating the correction information as needed in the exposure method taught by Kikuchi as modified by Tomimatu since, as shown by Irie, determining the new measurement divided areas based on evaluation results of non-linear component of the positional deviation amount is commonly used to perform alignment with high accuracy and high speed (col. 3, lines 19-22).

Regarding claim 35, although Kikuchi as modified by Tomimatu discloses the non-linear component of positional deviation amount of each of the measurement divided areas calculated with respect to every (K-1) lot (Kikuchi, para. [0029] and [0083], multiple lots with multiple substrates are processed with the steps from Fig. 5), Kikuchi as modified by Tomimatu does not appear to explicitly describe wherein the new measurement divided areas are determined based on evaluation results of the non-linear component of positional deviation amount of each of the measurement divided areas calculated.

However, Irie discloses wherein the new measurement divided areas are determined based on evaluation results of the non-linear component of positional deviation amount of each of the measurement divided areas calculated (Fig. 11, step 206 discloses evaluating the results of the non-linear component of positional deviation to determine the sample shot areas).

It would have been obvious to one skilled in the art at the time of the invention to have determined the new measurement divided areas based on evaluation results of non-linear component of the positional deviation amount as taught by Irie with

calculating the non-linear component for every lot and updating the correction information as needed in the exposure method taught by Kikuchi as modified by Tomimatu since, as shown by Irie, determining the new measurement divided areas based on evaluation results of non-linear component of the positional deviation amount is commonly used to perform alignment with high accuracy and high speed (col. 3, lines 19-22).

Regarding claim 37, Kikuchi further discloses the method wherein as the plurality of measurement divided areas on the photosensitive object, only the plurality of specific divided areas can be designated (Figure 5, steps 306 and 320, specific divided areas are measured (8 shots under the normal EGA measurement method) and position coordinates are calculated for all areas).

Regarding claim 38, Kikuchi further teaches the method wherein as the plurality of measurement divided areas on the photosensitive object, at least a part of remaining divided areas can be designated in addition to the plurality of specific divided areas (Figure 5, steps 308 and 310, all specific divided areas are measured and position coordinates are calculated for all areas).

Regarding claim 39, Kikuchi further teaches that the correction information is one of a correction map and a correction function (Figure 9, step 340, and Figure 12, step 412).

Regarding claim 42, Kikuchi further teaches the evaluation of the non-linear component of positional deviation amount of each of the plurality of measurement divided areas is performed, taking into consideration at least one of magnitude and a

dispersion degree of the non-linear component of positional deviation amount of each of the plurality of measurement divided areas in the correction information before update (page 17, paragraphs [189]-[190] and equation 8. The positional deviation amount vectors r_k include both the magnitude of deviation and dispersion degree—normally termed "direction"—of each respective shot area. The non-linear error of the wafer is composed of the non-linear error of the measured divided areas.).

Regarding claim 43, Kikuchi further teaches the evaluation of the non-linear component of positional deviation amount of each of the measurement divided areas is performed, using a predetermined evaluation function (page 17, paragraph [187] to compute the non-linear component of positional deviation amount of entire wafer, each positional deviation amount for all shot areas is taken into account.).

Regarding claim 44, Kikuchi further discloses that the plurality of divided areas on the photosensitive object are grouped into a plurality of blocks in advance, and the evaluation of the non-linear component of positional deviation amount of each of the measurement divided areas is performed with respect to each block (Figure 16, grouping the divided areas on the photosensitive object, or shot areas, before evaluating the non-linear error is an obvious variation of grouping the shots into a block after evaluating non-linear error).

Regarding claim 49, Kikuchi discloses a device manufacturing method (Figs. 17 and 18, a semiconductor device is manufactured via process steps in Fig. 18 and integration steps in Fig. 17) including a lithographic process wherein in the lithographic process, an exposure processing of a specific process is continuously or intermittently

performed to each of photosensitive objects in a plurality of lots by using the exposure method of claim 31 (Figs. 17, 18, and para. [0029] and [0083], multiple lots with multiple substrates are processed).

Regarding claim 50, Kikuchi discloses an exposure apparatus (exposure apparatus 100, Fig. 2) that performs an exposure processing of a specific process to each of photosensitive objects in a plurality of lots (para. [0029] and [0083], multiple lots with multiple substrates are processed), the apparatus comprising:

a moving body (wafer stage WST, Fig. 2) that holds a photosensitive object (Fig. 2, wafer stage WST holds and positions a wafer W);

a detection system (alignment system AS, Fig. 2) that detects actual measurement values of positional information of any divided areas among a plurality of divided areas on the photosensitive object held on the moving body (Fig. 2, alignment system AS detects the position of alignment marks in shot areas on the wafer),

a computation device (main control system 20, Fig. 2 and host 150, Fig. 1) that calculates an estimate value of position information of each of the plurality of divided areas (para. [0185], in step 310 of Fig. 5, the position of all shots are calculated by statistical computation based on measurement of positions of shots in terms of design), which is used to align each of the plurality of each of the plurality of divided areas with a predetermined point, by a statistical computation using actual measurement values of positional information of a plurality of specific divided areas among the plurality of divided areas on the photosensitive object detected by the detection system (Fig. 5 and para. [0185], the position-coordinates of the shot areas are determined via statistical

computation using a least square method consisting of EGA computation from sample shot areas (see para. [0009]) selected form the shot areas),

a creating device (main control system 20, Fig. 2 and host 150, Fig. 1) that, with respect to a first lot in the specific process, creates correction information (paras. [0203]-[0204] and Fig. 5, correction values are calculated) used to correct a non-linear component of positional deviation amount of each of the plurality of divided areas (Fig. 5, step 312, non-linear components of all shot areas are calculated) from an individual fiducial position (para. [0187], design position) based on the actual measurement values of positional information of the plurality of specific divided areas among the plurality of divided areas on the photosensitive object detected by the detection system and on the corresponding estimate of positional information calculated by the computation device (paras. [0186]-[0187] and Fig. 5, steps 312 and 314, correction information is calculated based on the difference between the position-coordinate for each shot as determined from the EGA computation of the sample shots in step 310 and the position-coordinate in terms of design, and the difference between the results of step 308 and step 310 are used to determined the non-linear component. Then, step 314 evaluates the non-linear component, which leads to the calculation of the correction values for the non-linear components of the deviations of all shots in step 318);

an updating device (main control system 20, Fig. 2 and host 150, Fig. 1) that, with respect to every (K-1) lot of second and subsequent lots in the specific process, for a plurality of measurement divided areas on the photosensitive object that includes at

least the plurality of specific divided areas, wherein the K is an integer not less than 2 (para. [0029] and [0083], multiple lots with multiple substrates are processed),

calculates a non-linear component of positional deviation amount of each of the measurement divided areas from an individual fiducial position based on an actual measurement value of positional information of each of the measurement divided areas detected by the detection device on the corresponding estimate value (para. [0186] and Fig. 5, in step 312, the non-linear components for each shot area are calculated by calculating the difference between the position-coordinate for each shot area for step 310), and

a control device (stage control system 19 with driving portion 24, Fig. 2) that controls a position of the photosensitive object via the moving body based on the estimate value of positional information of each of the plurality of divided areas and on the correction information that is latest, when exposing each of the plurlaity of divided areas (Fig. 2, stage control system 19 controls wafer stage WST with driving portion 24 to correctly position the wafer W for each shot to be correctly processed). Kikuchi does not appear to explicitly describe updating the correction information as needed in accordance with a magnitude of one of the calculated non-linear component of positional deviation amount of each of the measurement divided areas and a variation amount of the non-linear component, but does not update the correction information with respect to the remaining lots.

However, Tomimatu discloses updating information as needed but not updating the correction information with respect to the remaining lots (Fig. 3, step 22, the

obsolescence of data is used to determine whether to update information for further processing of lots).

It would have been obvious to one skilled in the art at the time of the invention to have included updating information as needed as taught by Tomimatu in the exposure apparatus with the predetermined intervals of performing the method taught by Kikuchi in since it is much more efficient to automate control of performing alignment calibration than to manually, and possibly needlessly, recalibrate every production lot.

Although Kikuchi as modified by Tomimatu discloses updating the non-linear correction information as needed, but not updating the correction information with respect to the remaining lots, Kikuchi as modified by Tomimatu does not appear to explicitly describe calculating a magnitude of one of the calculated non-linear component of positional deviation amount of each of the measurement divided areas and a variation amount of the non-linear component.

However, Irie discloses calculating a magnitude of one of the calculated non-linear component of positional deviation amount of each of the measurement divided areas and a variation amount of the non-linear component (Fig. 11, step 206, 210, and 211, the absolute value of the calculated non-linear error component is compared to a predetermined value).

It would have been obvious to one skilled in the art at the time of the invention to have used a calculated magnitude of one of the calculated non-linear component of positional deviation amount and a variation amount of the non-linear component as taught by Irie with updating the correction information as needed in the exposure

apparatus taught by Kikuchi as modified by Tomimatu since, as shown by Irie, a magnitude the calculated non-linear component of positional deviation is commonly used to determine which sample shots should be used to perform alignment with high accuracy and high speed (col. 3, lines 19-22).

Regarding claim 51, although Kikuchi discloses a determining device, and a calculating device (main control system 20, Fig. 2 and host 150, Fig. 1), Kikuchi as modified by Tomimatu does not appear to explicitly describe when updating the correction information among the plurality of divided areas, at least a part of remaining divided areas excluding the measurement divided areas are new measurement divided areas, and the correction information is updated using a non-linear component of positional deviation amount of each of the plurality of divided areas from the individual fiducial position calculated based on actual measurement values of positional information of all measurement divided areas including the new measurement divided areas and the corresponding estimate values.

However, Irie further discloses when updating the correction information among the plurality of divided areas, at least a part of remaining divided areas excluding the measurement divided areas are new measurement divided areas (Fig. 11, step 207, alternate shots are measured), and the correction information is updated using a non-linear component of positional deviation amount of each of the plurality of divided areas from the individual fiducial position calculated based on actual measurement values of positional information of all measurement divided areas including the new measurement

divided areas and the corresponding estimate values (Fig. 11, steps 207, 211, and 217, the alternate shots and sample shots are used to calculate arrangement coordinates).

It would have been obvious to one skilled in the art at the time of the invention to have used remaining divided areas as new measurement divided areas as taught by Irie with updating the correction information as needed with the exposure apparatus taught by Kikuchi as modified by Tomimatu since, as shown by Irie, using remaining divided areas as new measurement divided areas is commonly used to perform alignment with high accuracy and high speed (col. 3, lines 19-22).

Regarding claim 52, although Kikuchi as modified by Tomimatu discloses the determining device, Kikuchi as modified by Tomimatu does not appear to explicitly describe wherein the new measurement divided areas are determined based on evaluation results of the non-linear component of positional deviation amount of each of the plurality of divided areas included in the correction information.

However, Irie discloses wherein the new measurement divided areas are determined based on evaluation results of the non-linear component of positional deviation amount of each of the plurality of divided areas included in the correction information (Fig. 11, step 206 discloses evaluating the results of the non-linear component of positional deviation to determine the sample shot areas).

It would have been obvious to one skilled in the art at the time of the invention to have determined the new measurement divided areas based on evaluation results of non-linear component of the positional deviation amount as taught by Irie with updating the correction information as needed with the exposure apparatus taught by Kikuchi as

modified by Tomimatu since, as shown by Irie, determining the new measurement divided areas based on evaluation results of non-linear component of the positional deviation amount is commonly used to perform alignment with high accuracy and high speed (col. 3, lines 19-22).

Regarding claim 54, Kikuchi further discloses a first mode in which only the plurality of specific divided areas are designated as the plurality of measurement divided areas on the photosensitive object (Figure 5, steps 306 and 320, specific divided areas are measured (8 shots under the normal EGA measurement method) and position coordinates are calculated for all areas), and

a second mode in which the plurality of specific divided areas and at least a part of remaining divided areas are designated as the plurality of measurement divided areas on the photosensitive object are settable (Figure 5, steps 308 and 310, all specific divided areas are measured and position coordinates are calculated for all areas).

Regarding claim 55, Kikuchi further teaches that the correction information is one of a correction map and a correction function (Figure 9, step 340, and Figure 12, step 412).

Regarding claim 56, Kikuchi as modified by Tomimatu discloses an evaluation device (main control system 20, Fig. 2 and host 150, Fig. 1) that, with respect to a plurality of measurement divided areas on the photosensitive object including at least the plurality of specific divided areas, evaluates a non-linear component of positional deviation amount of each of the measurement divided areas from an individual fiducial position based on the actual measurement value of positional information of each of the

measurement divided areas detected by the detection system and on the estimate value of positional information calculated by the computation device (para. [0186] and Fig. 5, in step 312, the non-linear components for each shot area are calculated by calculating the difference between the position-coordinate for each shot area for step 310). However, Kikuchi as modified by Tomimatu does not appear to explicitly describe determining at least one of the number of new measurement divided areas to be added and an arrangement thereof, based on the evaluation results.

However, Irie discloses determining at least one of the number of new measurement divided areas to be added and an arrangement thereof, based on the evaluation results (Fig. 11, step 206 discloses evaluating the results of the non-linear component of positional deviation to determine the sample shot areas and Fig. 13A and col. 19, lines 60-65, shots adjacent to sample shots are chosen as alternative shots).

It would have been obvious to one skilled in the art at the time of the invention to have determined the new measurement divided areas based on evaluation results of non-linear component of the positional deviation amount as taught by Irie with calculating the non-linear component for every lot and updating the correction information as needed in the exposure method taught by Kikuchi as modified by Tomimatu since, as shown by Irie, determining the new measurement divided areas based on evaluation results of non-linear component of the positional deviation amount is commonly used to perform alignment with high accuracy and high speed (col. 3, lines 19-22).

Regarding claim 57, Kikuchi further discloses that the plurality of divided areas on the photosensitive object are grouped into a plurality of blocks in advance, and the evaluation device performs the evaluation of the non-linear component of positional deviation amount of each of the measurement divided areas is performed with respect to each block (Figure 16, grouping the divided areas on the photosensitive object, or shot areas, before evaluating the non-linear error is an obvious variation of grouping the shots into a block after evaluating non-linear error).

6. Claims 44 and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kikuchi as modified by Tomimatu in view of Irie as applied to claims 41 and 56 above, and further in view of Umatate (US Patent No. 4,833,621).

Regarding claims 44 and 57, Kikuchi as modified by Tomimatu in view of Irie, as detailed in claim rejection 41 above, teach the evaluation of said non-linear component of positional deviation amount of each of said plurality of measurement divided areas is performed. However, Kikuchi Kikuchi as modified by Tomimatu in view of Irie, in an alternate interpretation, does not appear to explicitly describe that the plurality of divided areas on said photosensitive object are grouped into a plurality of blocks in advance, and that the evaluation is performed with respect to each block.

However, Umatate does teach that the plurality of divided areas on said photosensitive object are grouped into a plurality of blocks in advance, and the evaluation of said non-linear component of positional deviation amount of each of said plurality of measurement divided areas is performed with respect to each block (column

2, lines 11-16, shots are grouped into blocks and then the blocks are aligned using several points in the block).

It would have been obvious to one skilled in the art at the time of the invention to have included grouping the plurality of divided areas into blocks in advance as taught by Umatate, with the evaluation of non-linear components of positional deviation taught by Kikuchi as modified by Tomimatu in view of Irie since, as shown by Umatate, grouping a plurality of divided areas on a photosensitive object is commonly done to enhance throughput by evaluating and completing alignment operations before substrate processing commences (column 1, lines 47-50). It would have been an obvious extension of the teachings of Umatate to have applied the block alignment method to non-linear corrections as well.

7. Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kikuchi as modified by Tomimatu in view of Irie as applied to claims 31 respectively above, and further in view of Matsumoto et al. (US 2001/0034563 A1).

Regarding claim 49, Kikuchi as modified by Tomimatu in view of Irie, in an alternate interpretation, does not explicitly disclose a lithographic process wherein in said lithographic process, an exposure processing of a specific process is continuously or intermittently performed to each of a plurality of photosensitive objects using the above disclosed exposure method.

However, Matsumoto et al. teaches a lithographic process wherein in said lithographic process, an exposure processing of a specific process is continuously or

intermittently performed to each of a plurality of photosensitive objects (Figure 3, a processing apparatus, apparatus A or K for instance, is able to perform multiple processing conditions, or specific processes, such as conditions 21 and 13 for apparatus A or conditions 28 or 57 for apparatus K. This means that the particular apparatus must necessarily be either continuously or intermittently processing lots using either one processing condition in the continuous case, or both processing conditions in the intermittent case. Figure 28 shows the grouping of lots by similar processing type and Figure 31 further shows the decision of whether to continue processing one type of lot group or to process a different lot group type based upon a determined priority.)

It would have been obvious to one skilled in the art at the time of the invention to have included the exposure processing of a specific process is continuously or intermittently performed to each of a plurality of photosensitive objects as taught by Matsumoto et al., with the exposure method taught by Kikuchi as modified by Tomimatu in view of Irie since it is very well know in the art that alternately processing a mixture of processing conditions as shown by Matsumoto et al. is commonly done to improve throughput in a manufacturing environment in which individual equipment is used to perform multiple processing conditions.

Response to Arguments

8. Applicant's arguments filed 8/20/2009 regarding newly amended claims 31, 50, and 61 have been fully considered but they are not persuasive.

9. Applicant argues on pages 13-16 that the references, even if combined, fail to result in the limitation "with respect to every (K-1) lot of second and subsequent lots in the specific process, for a plurality of measurement divided areas on the photosensitive object that includes at least the plurality of specific divided areas, calculating a non-linear component of positional deviation amount of each of the measurement divided areas from the individual fiducial position based on an actual measurement value of positional information of each of the measurement divided areas and on the corresponding estimate value, updating the correction information as needed in accordance with a magnitude of one of the calculated non-linear component of positional deviation amount of each of the measurement divided areas and a variation amount of the non-linear component, but not updating the correction information with respect to the remaining lots, and performing exposure while controlling the position of the photosensitive object based on the estimate value of positional information of each of the plurality of divided areas and on the correction information that is latest, where the K is an integer not less than 2." However, the examiner respectfully disagrees since Kikuchi discloses processing multiple lots (para. [0029] and [0083], multiple lots with multiple substrates are processed, meaning that K would be at least 2).

Furthermore, Kikuchi as modified by Tomimatu and further in view of Irie (US Patent No. 5,808,910), disclose the limitations of amended claims 31, 50, and 61 as noted above, specifically Kikuchi discloses with respect to every (K-1) lot of second and subsequent lots (since para. [0029] and [0083] disclose that multiple lots with multiple substrates are processed), calculating a non-linear component of positional deviation

(para. [0186] and Fig. 5, in step 312, the non-linear components for each shot area are calculated by calculating the difference between the position-coordinate for each shot area for step 310). Although Kikuchi does not specifically describe updating the correction information as needed in accordance with a magnitude of one of the calculated non-linear component of positional deviation amount of each of the measurement divided areas and a variation amount of the non-linear component, but not updating the correction information with respect to the remaining lots.

However, Tomimatu discloses updating information as needed but not updating the correction information with respect to the remaining lots (Fig. 3, step 22, the obsolescence of data is used to determine whether to update information for further processing of lots).

It would have been obvious to one skilled in the art at the time of the invention to have included updating information as needed as taught by Tomimatu in the exposure method with the predetermined intervals of performing the method taught by Kikuchi in since it is much more efficient to automate control of performing alignment calibration than to manually, and possibly needlessly, recalibrate every production lot.

Although Kikuchi as modified by Tomimatu discloses updating the non-linear correction information as needed, but not updating the correction information with respect to the remaining lots, Kikuchi as modified by Tomimatu does not appear to explicitly describe calculating a magnitude of one of the calculated non-linear component of positional deviation amount of each of the measurement divided areas and a variation amount of the non-linear component.

However, Irie discloses calculating a magnitude of one of the calculated non-linear component of positional deviation amount of each of the measurement divided areas and a variation amount of the non-linear component (Fig. 11, step 206, 210, and 211, the absolute value of the calculated non-linear error component is compared to a predetermined value).

It would have been obvious to one skilled in the art at the time of the invention to have used a calculated magnitude of one of the calculated non-linear component of positional deviation amount and a variation amount of the non-linear component as taught by Irie with updating the correction information as needed in the exposure method taught by Kikuchi as modified by Tomimatu since, as shown by Irie, a magnitude the calculated non-linear component of positional deviation is commonly used to determine which sample shots should be used to perform alignment with high accuracy and high speed (col. 3, lines 19-22).

Therefore, Applicant's arguments regarding claims 31, 50, and 61 are not found to be persuasive and claims 31, 50, and 61 are rejected as being unpatentable over Kikuchi in view of Tomimatu and further in view of Irie.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christina Riddle whose telephone number is (571)270-7538. The examiner can normally be reached on Monday- Thursday 7:00-17:30 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571)272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/C. R./
Examiner, Art Unit 2882

/Edward J Glick/
Supervisory Patent Examiner, Art Unit 2882